

Rugged Multigas Sensor for Planetary Missions, Phase I

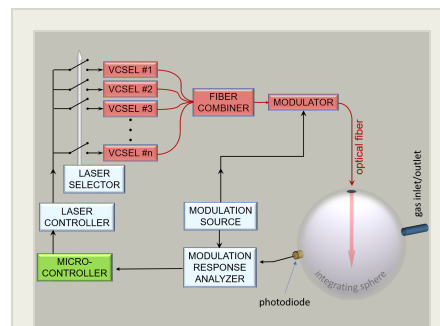
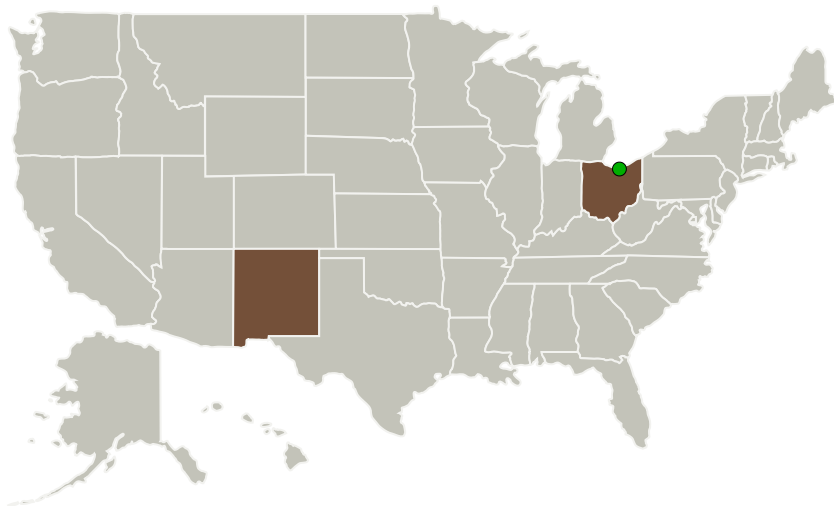
Completed Technology Project (2017 - 2017)



Project Introduction

Mesa Photonics proposes an optical gas analyzers suitable for planetary and lunar missions that will be smaller, more rugged, and more reliable than existing technology. These are point sensors for measurements within planetary atmospheres or for analysis of gases collected during lunar activities. Target gases include CH₄, CO₂, CO, NH₃, O₂, C₂H₂, C₂H₄, H₂S, and H₂O. The innovation uses optical absorption spectroscopy at near-infrared wavelengths. Sensitivities will range from 2 ppm for H₂S (in a 101 kPa mixture) to less than 1 ppb for HF. Instruments will weigh less than 3kg, be under 1 liter in volume, and draw less than 10W. Power consumption could be as low as 3W depending on platform temperature stabilization. The Phase I project will test the new technique by (1) assembling and testing instrumentation electronics, (2) measuring detection sensitivity, precision, drift, linearity and dynamic range using CH₄ as a representative gas, (3) develop a numerical model of the technique, and (4) determine the expected physical and performance specifications for instruments that could be used on planetary missions and lunar deployment. Based on the most recent decadal survey, possible planetary missions include a dropsonde for studying the atmosphere of Venus, analysis of trace gases in the Martian atmosphere, characterization of atmospheric composition of the moons of Jupiter and Saturn, and a dropsonde into the atmosphere of Uranus.

Primary U.S. Work Locations and Key Partners



Rugged multigas sensor for planetary missions, Phase I Briefing Chart Image

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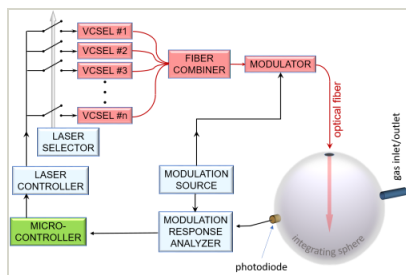


Organizations Performing Work	Role	Type	Location
Mesa Photonics, LLC	Lead Organization	Industry	Santa Fe, New Mexico
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

New Mexico	Ohio
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Images



Briefing Chart Image

Rugged multigas sensor for planetary missions, Phase I Briefing Chart Image
 (<https://techport.nasa.gov/image/127768>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Mesa Photonics, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

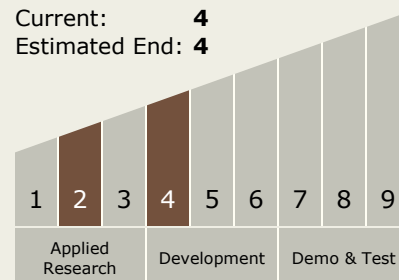
Carlos Torrez

Principal Investigator:

David Bomse

Technology Maturity (TRL)

Start: 2
 Current: 4
 Estimated End: 4



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.4 Environment Sensors

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System